$a_n = a_1 + (n-1)d$

11-2 Arithmetic Series

Series is the sum of a sequence

8, 12, 16, 20, 24, sequence

8 + 12 + 16 + 20 + 24 series

$S_1 =$ 8

$S_2 =$ 8+12=20

$S_3 =$ 36

$S_4 =$ 56

$S_5 =$ 80

In general, $a_1, a_2, a_3, a_4, ...a_n$

$S_n = a_1 + a_2 + a_3 + a_4 + ... + a_n$

Σ sigma summation sign

8 + 12 + 16 + 20 + 24

Find a_n .

$a_n = a_1 + (n-1)d$

$a_n = 8 + (n-1)4$

$4n - 4$

$a_n = 4n + 4$

$\sum_{n=1}^{5} (4n+4)$

$$\sum_{n=1}^{5}(4n + 4)$$

"the sum of 4n + 4 as n goes from 1 to 5"

Expanded form =

8 + 12 + 16 + 20 + 24

$$\sum_{n=3}^{7}(2n - 3)$$

Put in Expanded form.

= 3 + 5 + 7 + 9 + 11

Put the following series into sigma notation:
3 + 6+ 9 + ... + 36

$a_n = 3+\underbrace{(n-1)3}_{3n-3}$

$\boxed{\sum_{n=1}^{12}(3n)}$

$36=3n$
$12=n$

Challenge:
Find the sum of the integers from 1 to 100

$1 + 100 = 101$
$2 + 99 = 101$
$3 + 98 = 101$

$S_n = \frac{n}{2}(a_1+a_n)$

Friedrich Gauss

$a_1 =$
$a_{100} =$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Ex:
Find the sum of the given sequence:
5, 10, 15, 20

$S_4 = \frac{4}{2}(5+20)$
$=50$

Ex:
Find the sum of the given sequence:
3, 6, 9, 12, 15, 18

$S_6 = \frac{6}{2}(3+18)$
$S_6 = 63$

Ex:
Find the sum of the first 50 terms of the given sequence:
3, 6, 9, 12, 15, 18

$S_n = \frac{n}{2}(a_1 + a_n)$

$\frac{n}{2}(a_1 + a_1 + (n-1)d)$

$S_n = \frac{n}{2}[2a_1 + (n-1)d]$

$S_{50} = \frac{50}{2}[2 \cdot 3 + 49 \cdot 3]$

$S_{50} = 3825$

When you don't have the last term, either find it or use this formula.

$$S_n = \frac{n}{2}(2a_1 + (n-1)d)$$

Ex:
$a_n = -14$
$n = 9$
$d = -8$
$S_9 =$ 162

$a_n = a_1 + (n-1)d$

$-14 = a_1 + 8 \cdot (-8)$

$50 = a_1$

$S_9 = \frac{9}{2}(50 + -14)$

HW p586
15-37~~odd~~, 40
15 - 36 x3